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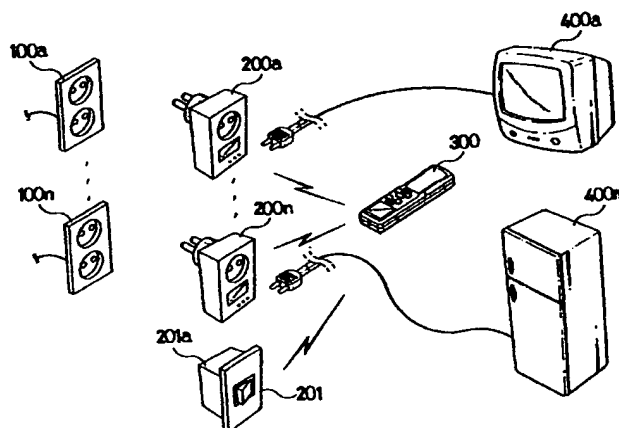
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(54) Title: WIRELESS POWER SWITCHING SYSTEM AND METHOD OF CONTROLLING THE SAME



(57) Abstract: The invention relates to a wireless power switching system and method of controlling the same. The wireless power switching system includes one or more power switching units and a wireless remote controller. Each of the power switching units includes a wireless signal receiving unit for demodulating and decoding a received wireless signal, a power switch for supplying/interrupting power applied through an outlet to/from electric appliances, and a first control unit for controlling the operation of the power switch in response to a signal demodulated and decoded by the wireless remote controller. The wireless remote controller includes a memory for storing unique codes allocated to the power switching units and instruction codes required to control the power switching unit, a second control unit for accessing the memory in response to a users instruction inputted through a keypad and generating a signal for controlling a certain power switching system, and a wireless signal transmitting unit for encoding and modulating a signal generated by the second control unit and wirelessly transmitting the encoded and modulated signal to the power switching unit.

WIRELESS POWER SWITCHING SYSTEM AND METHOD OF CONTROLLING THE SAME

Technical Field

The present invention relates generally to a wireless power switching system and
5 method of controlling the same, and more particularly to a wireless power adapter system
and method of controlling the same, which can remotely control power supplied to
electric appliances from an outlet.

Background Art

In general, electric appliances being used at houses, offices and work sites are
10 supplied with electricity via a power supply called an outlet. When a plug of an electric
appliance is inserted into an outlet, power is supplied to the corresponding electric
appliance via the outlet, thus operating the electric appliance.

In order to produce electricity as a power source for operating the electric
appliances, many countries operate a variety of power plants at enormous costs. The
15 countries supply electricity produced in these power plants to the houses or necessary
places, and impose electric charges based upon the quantity of supplied electricity.
Therefore, consumers take into consideration the amount of power consumption of an
electric appliance as well as the performance thereof when they purchase the electric
appliance, so as to reduce power consumption.

20 In order to reduce power consumption, however, it is necessary to efficiently use
electric appliance as well as purchase electric appliances that consume small amounts of
power. When the plug is inserted into an outlet, a small amount of electricity is
continuously supplied to the electric appliance, thereby resulting in power consumption.

In order to prevent unnecessary power consumption as above, governments and
25 public organizations recommend that users separate the plugs of their electric appliances
from outlets if the electric appliances are not to be used for a long time. However, the

effect of such recommendation is very insignificant due to inconvenience in use.

In other words, when a user goes out or is in a situation corresponding thereto, the user is recommended to personally check the operating states of the electric appliances in use and separate the plugs of unused electric appliances from the outlets in order to prevent unnecessary power consumption. However, this causes significant inconvenience to the user where multiple electric appliances are used.

Disclosure of the Invention

Accordingly, the present invention has been made keeping in mind the above problems occurring in the prior art, and an object of the present invention is to provide a wireless power switching system and method of controlling the same, which can allow a user to remotely control power supplied to various electric appliances, thereby increasing user's convenience.

In order to accomplish the above object, the present invention provides a wireless power switching system for supplying/interrupting power applied through an outlet to electric appliances, comprising one or more power switching units each comprised of an RF signal receiving unit for demodulating and decoding a received RF signal, a power switch for supplying/interrupting power applied through an outlet to electric appliances, and a first control unit for controlling the operation of the power switch in response to a signal demodulated and decoded by the RF signal receiving unit; a wireless remote controller comprised of: a memory for storing unique codes allocated to the power switching units and instruction codes required to control the power switching units, a second control unit for accessing the memory in response to a user's instruction inputted through a keypad and generating a control signal for controlling a certain power switching unit, and an RF signal transmitting unit for encoding and modulating a signal generated by the second control unit and wirelessly transmitting the encoded and modulated signal to the power switching unit.

Each of the power switching units further includes an ON/OFF/AUTO switch for turning on/off the power switch in response to the operation of the user or setting an

operation mode of the power switching unit to receive an output signal of the wireless remote controller; a timer for counting a time; and a time setting unit for storing prearranged time information inputted by the user to control the power switch, wherein the first control unit sets the operation mode of the power switching unit according to switching operation of the ON/OFF/AUTO switch and switches over the power switch if a time indicated by the timer reaches a prearranged time.

Further, the remote controller further includes a timer for setting a time; a time setting unit for storing information of a power switching unit subject to control and prearranged time information, which are inputted by the user, so as to control the power switch; and a card recognizing unit for recognizing a card storing identification information of an authorized user, information of a power switching unit subject to control and a control instruction of a corresponding power switching unit, wherein the second control unit accesses the memory to generate a control signal for controlling a corresponding power switching unit if a time indicated by the timer reaches a prearranged time, and generates a control signal for controlling a specific power switching unit according to a recognized result by the card recognizing unit.

The second control unit divides the power switching units subject to control into a plurality groups to manage the divided power switching units using a directory form.

The present invention further provides a method of controlling a wireless power switching system, the power switching system having a plurality of power switching units for controlling the supply of power to electric appliances and one or more remote controllers for wirelessly controlling operation of the power switching units, comprising the steps of switching each of the power switching units to a registration standby mode, by a control unit of each power switching unit, in response to switching of a reset key; registering each power switching unit switched to the registration standby mode in a selected group and a position in the selected group, by a control unit of the remote controller, in response to key input by a user; wirelessly transmitting corresponding registration information to each power switching unit switched to the registration standby mode by the control unit of the remote controller if each power switching unit is registered in the remote controller; and storing the registration information extracted from the received signal in a memory by the control unit of each power switching unit if

a wirelessly transmitted registration information signal is received.

The registration information signal includes group information, in which each power switching unit switched to the registration standby mode will be registered, and position information in the corresponding group.

5 Further, if the reset key is switched, the control unit of each power switching unit clears all data stored in the memory.

The present invention further provides a method of controlling a power switching unit in a wireless power switching system for supplying/interrupting power applied through an outlet to electric appliances in response to a switching operation of a user or a transmission signal from a wireless remote controller, comprising the steps of performing a standby mode for receiving the transmission signal from the wireless remote controller through an RF signal receiving unit if an operation mode is set to an RF signal reception mode; determining whether a unique number included in a corresponding RF signal is identical with a unique number allocated to the power switching unit if an RF signal is received; supplying or interrupting power to electric appliances by switching a power switch in response to a control instruction included in the RF signal if the received unique number is identical with a unique number allocated to the power switching unit; supplying power to electric appliances by switching the power switch if the operation mode is set to a power supplying mode; and interrupting power supplied to the electric appliances by switching the power switch if the operation mode is set to a power interruption mode.

The present invention further provides a method of controlling a wireless remote controller in a wireless power switching system for supplying/interrupting power applied through an outlet to electric appliances in response to a switching operation of a user or a transmission signal from a wireless remote controller, comprising the steps of accessing a memory to search for a unique code and a control instruction code of a corresponding power switching unit subject to control in response to a user control instruction inputted to control at least one power switching unit for supplying/interrupting power applied through an outlet to electric appliances; generating a control signal for controlling a power switch of a corresponding power switching unit using a searched code; and converting the generated control signal to an RF signal and wirelessly transmitting the

RF signal to a corresponding power switching unit.

The wireless remote controller control method further comprises the steps of determining whether a prearranged time has arrived if prearrangement setting is performed in response to a user control instruction inputted to control at least one power switching unit for supplying/interrupting power applied through an outlet to electric appliances; searching for a power switching unit subject to prearranged control if the prearranged time has arrived; and generating a control signal for controlling a corresponding power switching unit and wirelessly transmitting the control signal if the power switching unit subject to prearranged control is searched for.

The wireless remote controller control method further comprises the steps of generating a control signal for controlling a corresponding power switching unit and wirelessly transmitting the control signal if a card which stores identification information of an authorized user, information of a power switching unit subject to control and a control instruction of a corresponding power switching unit, is recognized.

Brief Description of the Drawings

Fig. 1 is a view schematically showing a power switching system according to the present invention;

Fig. 2 is a view showing the internal construction of a power switching unit shown in Fig. 1;

Fig. 3 is a view showing the internal construction of a remote controller shown in Fig. 1;

Fig. 4 is a view showing examples of a display unit and a keypad of the remote controller shown in Fig. 3;

Fig. 5 is a view showing a format of a registration information signal transmitted to the power switching unit for the allotment of a unique code;

Fig. 6 is a view showing a transmission process of the registration information signal shown in Fig. 5;

Fig. 7 is a view showing a format of an RF control signal transmitted from the remote controller to control the power switching unit;

Fig. 8 is a control flowchart of the power switching unit shown in Fig. 2; and

Fig. 9 is a control flowchart of the remote controller shown in Fig. 3.

Best Mode for Carrying Out the Invention

Hereinafter, preferred embodiments of the present invention are described in detail with reference to accompanying drawings.

Fig. 1 is a view schematically showing a wireless power switching system according to a preferred embodiment of the present invention.

Reference numerals 100a to 100n are typical outlets installed to supply power to electric appliances. Generally, the outlets provide power of alternating current (AC) 110V or 220V. Each outlet has circular or rectangular holes formed therein, and if a plug of an electric appliance is inserted into the holes, power is supplied to a corresponding electric appliance.

Reference numerals 200a to 200n are power switching units proposed in the present invention. A plug which is inserted into each of outlets 100a to 100n for supplying power is formed in a portion of each power switching unit, while an outlet into which a plug of each electric appliance is inserted is formed in its opposite portion. The power switching unit is used as an AC to AC converter, and controls the supply of power to each electric appliance according to a reception result of an RF signal.

Reference numeral 201 is a power switch used to turn on/off a light, wherein a power switch box 201A is arranged therein. The power switching unit of the present invention is installed in the power switch box 201a to control the supply of power to the light.

Reference numeral 300 is a wireless remote controller proposed in the present invention, which controls the operation of the power switching unit in a wireless manner. The wireless remote controller is constructed to be portable and movable, and outputs a radio frequency (RF) signal to control the supply of power to a corresponding electric appliance according to the key input of a user and a card recognition result.

Reference numeral 400a to 400n are electric appliances generally used in homes, such as a television and a refrigerator. The electric appliances 400a to 400n are each

equipped with a plug which can be supplied with power from the power switching unit of the present invention.

Fig. 2 is a view showing the internal construction of the power switching unit shown in Fig. 1. A control unit 214 for controlling the entire operation of the power switching unit controls power applied to a corresponding electric appliance from an outlet in response to the switching operation of the user. Further, the control unit 214 controls power applied to a corresponding electric appliance in response to a received RF signal and prearrangement setting of the user. In addition, the control unit 214 controls the display of power supply state and the driving of a timer based on the prearrangement setting, and controls operations of components to be later described.

Meanwhile, a timer 211 counts a time under the control of the control unit 214 and transmits the counted result to the control unit 214. In this case, the control unit 214 performs a prearrangement setting function of the power switching unit using the counted result of the timer 211.

The power switch 213 is disposed between a plug formed in a portion of the power switching unit and an outlet formed in an opposite portion thereof, and supplies/interrupts power applied through the plug to a corresponding electric appliance through an outlet in response to the on/off switching control of the control unit 214.

In order to control power supplied to electric appliances, prearranged time information inputted in response to user operation is stored in a time setting unit 212. The control unit 214 controls the power switch 213 to supply/interrupt power to the electric appliances according to the prearranged time information stored in the time setting unit 212.

On the other hand, an ON/OFF/AUTO switch 216 is used to set an operation mode of the power switch 213. When the user sets the ON/OFF/AUTO switch 216 to ON or OFF, the power switch 213 is switched to supply or interrupt power to electric appliances. Further, when the ON/OFF/AUTO switch 216 is set to AUTO, the ON/OFF/AUTO switch 216 transmits a reception instruction to the control unit 214 to receive an RF signal.

A light emitting diode (LED) driving unit 217 displays the operation state of the power switching unit of the present invention through an LED. For example, if the power

is supplied to electric appliances through the power switching unit, the LED driving unit 217 turns on the LED, while if the power is interrupted, the LED driving unit 217 turns off the LED, such that power supply and interrupt states can be displayed. According to user's selection, the LED can operate to display the contrary.

5 The power supplying unit 218 supplies operation power to the power switching unit, and supplies a driving voltage to respective components. The power supplying unit 218 can use AC power applied from the outside, or, alternatively, use power of a battery, according to user's selection.

10 Meanwhile, the RF signal receiving unit 215 receives a signal transmitted from the wireless remote controller of the present invention, performs demodulation and decoding operations, and transmits the demodulated and decoded result to the control unit 214 so as to control power supplied to each electric appliance. The RF signal receiving unit 215 receives and processes a digital-modulated and encoded signal; however, it can receive and process an RF signal which is analog-modulated or signal-processed using a
15 method corresponding to the analog modulation.

 Preferably, the timer 211, the time setting unit 212 and the LED driving unit 217 are selectively employed to more broadly utilize the wireless power switching system of the present invention.

20 Fig. 3 is a view showing the internal construction of the wireless remote controller for transmitting an RF signal to control the operation of the power switching unit.

 A control unit 316, which controls the entire operation of the wireless remote controller, generates an RF signal including an instruction for controlling power supplied to a corresponding electric appliance through an outlet on the basis of the switching
25 operation of the user.

 Further, the control unit 316 generates an RF signal for controlling power supplied to a corresponding electric appliance according to a prearrangement setting of the user. In addition, the control unit 316 controls the various operations relating to the execution of the present invention, such as a key input state on a keypad, memory access,
30 the reading of a recognized card and monitoring of arrival of a prearranged time, and also controls operations of the components to be described later.

A display unit 315 displays the power supply state of the power switching unit under the control of the control unit 316 and information inputted by the user. Therefore, the user can understand various items relating to the supplying of power on the basis of operation results displayed on the display unit 315. The display unit 315
5 can be realized as a liquid crystal display (LCD).

On the other hand, a memory 317 stores a unique code of each power switching unit required to execute the present invention and instruction codes for controlling the power switching unit.

Further, a keypad 311 is comprised of a plurality of keys, whereby the user can
10 control the supply of power to a required electric appliance by operating keys on the keypad 311. The number of keys is realized generally to correspond to that of power switching units subject to control; however, it can be realized to be equal to or less than that of the power switching units.

Meanwhile, a card recognizing unit 312 recognizes integrated circuit (IC) cards,
15 barcode cards and magnetic cards provided to authorized users. The reason for this is to allow the user to more conveniently control the supply of power to a required electric appliance. That is, if the user passes a card storing his approved identification information, information of a power switching unit subject to control and a control instruction of a corresponding power switching unit through the card recognizing unit 312,
20 he can more easily control the supply of power to a required electric appliance.

A timer 313 counts a time under the control of the control unit 316, and transmits the counted result to the control unit 316. In this case, the control unit 316 performs a prearrangement setting function of the power switching unit using the counted result of the timer 313.

A time setting unit 314 stores prearranged time information inputted by the user
25 operation to control power applied to each electric appliance. The control unit 316 generates an RF signal including an instruction for controlling the power switching unit in response to prearranged time information stored in the time setting unit 314.

A rechargeable battery or a disposable battery is used as a battery 319 which
30 generates and provides operating power of the wireless remote controller and driving power of each component.

Further, an RF signal transmitting unit 318 encodes and modulates a control instruction of the power switching unit generated on the basis of the key input of the user and a card recognition result as an RF signal and transmits the RF signal. The RF signal transmitting unit 318 performs digital modulation and encoding; however, it can encode and modulate the control instruction using an analog method or a method corresponding to the analog method to be transmitted.

Hereinafter, the operation of the wireless power switching system of the present invention having the above construction is described in detail with reference to the accompanying drawings.

As described above, a wireless power switching system in accordance with the invention comprises a plurality of power switching units 200a to 200n and 201 for controlling the supply of power to electric appliances and at least one wireless remote controller 300 for wirelessly controlling the operation of power switching units 200a to 200n and 201. Each of the power switching units 200a to 200n and 201 has no data in its own memory in the initial stage, and the power switching units 200a to 200n and 201 to be controlled are not registered in the remote controller 300.

Therefore, in order to perform individual, grouped and integrated remote control over the plurality of power switching units 200a to 200n and 201, it is required to register each of the power switching units 200a to 200n and 201 subject to control in the remote controller 300. Also, each of power switching units 200a to 200n and 201 is allocated with a unique number or ID so as to determine whether a control signal wirelessly transmitted from the remote controller 300 is its own control signal or not.

For this purpose, the invention employs a technique that primarily registers the power switching units 200a to 200n and 201 subject to control in the remote controller 300 and wirelessly transmits registration information of the registered power switching units 200a to 200n and 201 to the corresponding power switching units to allocate the unique numbers of the power switching units 200a to 200n and 201. This enables the plurality of power switching units 200a to 200n and 201 and the remote controller 300 to be used universally.

Referring to Figs. 4 to 6, a detailed description will be given of a process of

registering the power switching units 200a to 200n and 201 subject to control in the remote controller 300 and wirelessly transmitting the registration information to the power switching units 200a to 200n and 201 to allocate the unique numbers.

Fig. 4 is a view showing examples of a display unit and a keypad of the wireless remote controller for wirelessly controlling the operation of each of the power switching units, Fig. 5 is a view showing a format of a registration information signal transmitted to the power switching unit for the allotment of a unique code, and Fig. 6 is a view showing a transmission process of the registration information signal shown in Fig. 5.

First, in order to register each power switching unit (for example, 200a) subject to control in the remote controller and wirelessly transmit the registration information to the power switching unit 200a to allocate the unique number, the power switching unit 200a is primarily coupled into an outlet and then a reset key of the corresponding power switching unit 200a is switched so that the corresponding power switching unit 200a is switched to a registration standby mode. In this case, switching the reset key clears all data stored in the memory of the power switching unit 200a.

As the power switching unit 200a is switched to the registration standby mode, a letter A is reversed when a user presses an enter key 311a on a keypad 311 of the remote controller shown in Fig. 4 for 2 seconds. The letter A indicates the first of three groups displayed in an LCD window of the display unit 315.

The groups are set in order to efficiently control the plurality of power switching units which are subject to control. For example, a total of 27 power switching units can be controlled with a few keys by operating 9 power switching units in each of A, B and C groups. Further, various control methods such as individual, grouped and integrated control methods can be applied.

When the letter A indicating the first group is reversed, the user can select one of the three groups in which the power switching unit 200a will be registered by pressing left and right direction keys 311b and 311c in the keypad 311. Also, after selecting the group in which the power switching unit 200a will be registered, the user can select a position in the corresponding group, i.e. one of bulbs designated with numbers 1 to 9 in Fig. 4, in

which the power switching unit 200a will be registered by pressing up and down direction keys 311d and 311e in the remote controller keypad 311.

After selecting the group and the registered position in the corresponding group in which the power switching unit 200a will be registered, the user presses the enter key 311a on the remote controller keypad 311 for a short time to complete the registration process of the remote controller for the corresponding power switching unit 200a. Then, the registered position in the selected group in which the power switching unit 200a is registered, i.e. a bulb designated with 1, turns on.

In addition, upon completing the registration process of the power switching unit 200a in the remote controller, the control unit 316 of the remote controller wirelessly transmits the registration information of the power switching unit 200a in the signal format shown in Fig. 5 so as to allocate the unique number to the corresponding registered power switching unit 200a.

The registration information signal transmitted to the power switching unit 200a for the allocation of the unique number includes a start bit field, an in-use remote controller ID field, a T/C registration ID field, a T/C registration ID-1 field, a group field, a T/C registration flag field, an end bit field and an error check (CRC) field. The functions of the fields are as follows.

The start bit field indicates the start of data, and is composed of 4 bits of "1010."

The in-use remote controller ID field indicates the unique number of the remote controller for generating the registration information signal, and is allocated via hardware manipulation at the time of initially manufacturing the remote controller.

The T/C registration ID field indicates the position in which the power switching unit is registered, and has one of values 1 to 9.

The T/C registration ID-1 field is used to prevent malfunction in re-registration of the power switching unit and change the registered position of the power switching unit.

The group field indicates a group in which the power switching unit is registered. If the group is divided into three groups A, B and C, the group A is allocated with 000, the group B with 001 and the group C with 010.

The T/C registration flag field indicates whether the power switching unit is registered or not, and is always set to "1" if the power switching unit is registered once.

The end bit field informs the end of the data, and is composed of the 4 bits of "0101" which is a reversed value of the start bit.

5 The error check (CRC) field is used for checking errors in the T/C registration ID field, the T/C registration ID-1 field, the group field and the T/C registration flag field.

When the remote controller completes the registration process for the power switching unit as described above, the registration information signal having the foregoing format is wirelessly transmitted to the corresponding power switching unit to allocate the
10 unique number to the power switching unit. Since the remote controller and the power switching unit do not operate in a hand-shaking manner, the control unit 316 of the remote controller unidirectionally and wirelessly transmits the registration information signal up to five times as shown in Fig. 6.

Meanwhile, when the registration information signal is received, the
15 corresponding power switching unit 200a stores the registration information extracted from the received signal in its own memory. Since the unique number is allocated to the power switching unit 200a in this manner, the power switching unit 200a can supply or interrupt power to the electric appliance via the power switch 213 in response to an RF control signal transmitted from the remote controller 300 so as to control power applied to the
20 electric appliance.

In other words, the RF control signal includes an ON/OFF control bit field for controlling the operation of the power switching unit as well as an in-use remote controller ID field, a T/C control ID field, a T/C control ID-1 field and a group field, as shown in Fig. 7. The power switching unit 200a compares the unique number included in the RF
25 control signal with the unique number stored in its own memory, and if the unique numbers are identical with each other, controls the power switch 213 based upon a control code included in the ON/OFF control bit field to supply or interrupt power to the electric appliance.

The above operations are described in detail with reference to Figs. 8 and 9.

30 Fig. 8 is a control flowchart of the power switching unit of the present invention.

If the power switching unit is inserted into an outlet to supply operating power, the control unit 214 of the power switching unit determines whether the ON/OFF/AUTO switch 216 is operated at step ST401. If the ON/OFF/AUTO switch 216 is operated, the control unit 214 determines whether the ON/OFF/AUTO switch 216 is switched to an AUTO mode at step ST402.

If the ON/OFF/AUTO switch 216 is not switched to the AUTO mode, the control unit 214 determines whether the ON/OFF/AUTO switch 216 is switched to an ON or OFF mode at step ST403. If the ON/OFF/AUTO switch 216 is switched to the ON mode, the control unit 214 drives the power switch 213 to supply power to a corresponding electric appliance at step ST404, and controls the LED driving unit 217 to turn on the LED at step ST405.

On the other hand, if the ON/OFF/AUTO switch 216 is switched to the OFF mode, the control unit 214 drives the power switch 213 to interrupt power supplied to the electric appliance at step ST S406, and controls the LED driving unit 217 to turn off the LED at step ST407.

Meanwhile, if the ON/OFF/AUTO switch 216 is switched to the AUTO mode, the control unit 214 enters a standby mode for receiving an RF signal from the wireless remote controller of the present invention at step ST408. If the transmission signal from the remote controller is received through the RF signal receiving unit 215 in the standby mode, the control unit 214 demodulates and decodes the received RF signal at steps ST409 and ST410. These are operations for detecting a switching instruction of the power switch 213, included in the received RF signal.

That is, when the received RF signal is demodulated and decoded, the control unit 214 determines whether the unique number (ID) included in the RF signal is identical with a unique number allocated to the control unit 214 at step ST411. If the unique number included in the RF signal is identical with a unique number allocated to the control unit 214, the control unit 214 determines whether a manipulation instruction of the power switch 213 is included in the RF signal at step ST412.

If the manipulation instruction of the power switch 213 is included in the RF signal, the control unit 214 drives the power switch 213 in response to the manipulation instruction at step ST413. That is, if the power switch 213 is in an OFF state in which

power is interrupted, the control unit 214 switches the power switch 213 to an ON state, while if the power switch 213 is in the ON state, the control unit 214 switches the power switch 213 to the OFF state.

Further, when the switching operation of the power switch 213 is performed, the control unit 214 controls the LED driving unit 217 to turn on/off the LED such that the user can recognize the switching state of the power switch 213 at step ST414. In this case, the on/off operations of the LED are achieved in synchronization with the switching operations of the power switch 213.

As described above, the power switching unit of the present invention supplies or interrupts power to electric appliances on the basis of a personal operation of the user or the received RF signal. In addition, power can be supplied or interrupted to electric appliances according to the arrival of a prearranged time if the timer 211 and the time setting unit 212 are used. A detailed description of this construction is omitted because those skilled in the art can easily implement such a construction.

Meanwhile, the remote controller of the present invention for generating an RF signal to control the power switching unit stands by if there is not any user operation or any request when power is supplied to the remote controller, as shown in Fig. 9, at step ST501.

In such a standby state, the control unit 316 of the wireless remote controller determines whether a current operation mode of the wireless remote controller is set to a prearrangement setting mode at step ST502. If the current operation mode of the wireless remote controller is set to the prearrangement setting mode, the control unit 316 determines whether a current time indicated by the timer 313 reaches a prearranged time stored in the time setting unit 314 at step ST503.

If the current time reaches the set prearranged time, the control unit 316 searches the memory 317 for a power switching unit subject to control at step ST504, generates a control signal for driving the power switch 213 of the searched power switching unit and wirelessly transmits the control signal to a corresponding power switching unit through the RF signal transmitting unit 318 at step ST505. At this time, the RF signal contains the unique number (ID) of the power switching unit subject to control and a control instruction for turning ON/OFF the power switch 213.

Meanwhile, if the current operation mode of the wireless remote controller is not set to the prearrangement setting mode, the control unit 316 determines whether any key on the keypad 311 is inputted at step ST506. If any key is inputted, the control unit 316 detects an inputted key at step ST507. The control unit 316 determines whether the detected key is for driving prearrangement of a specific power switching unit at step ST508. If the inputted key is for prearrangement setting, the control unit 316 enters the prearrangement setting mode and performs the prearrangement setting for controlling a corresponding power switching unit according to a predetermined sequence at step ST509.

On the other hand, if the inputted key is not for the prearrangement setting, the control unit 316 determines whether the inputted key is for driving the power switch 213 of a specific power switching unit at step ST510. If the inputted key is for driving the power switch 213, the control unit 316 generates a control signal including a unique number (ID) of the power switching unit subject to control and a control instruction for turning ON/OFF the power switch 213 and wirelessly transmits the control signal to a corresponding power switching unit through the RF signal transmitting unit 318, so as to drive a corresponding power switch 213 at step ST511. If the inputted key is not for driving the power switch 213, the control unit 316 performs a function allocated to the key at step ST512.

Further, although not shown in the drawings, if an IC card, a barcode card and a magnetic card storing information of a power switching unit subject to control and prearrangement setting information for controlling a power switching unit are passed through the card recognizing unit 312, a control signal is generated according to the above process and is wirelessly transmitted to a corresponding power switching unit through the RF signal transmitting unit 318, such that the supply of power to a designated electric appliance can be more easily controlled.

Industrial Applicability

As described above, the present invention provides a wireless power switching system and method of controlling the same, which can perform efficient power

management by wirelessly controlling power supplied to various electric appliances at a remote plate. That is, if a user goes out, the present invention can interrupt power supplied to electric appliances more easily and conveniently, and prevent unnecessary power consumption.

5 Further, the present invention primarily registers the power switching units subject to control by the user and wirelessly transmits the registration information to the power switching units to allocate unique numbers to the corresponding power switching units rather than allocating the power switching units with the unique numbers at the time of manufacturing the power switching system via wireless remote control and providing the
10 allocated unique numbers stored in the remote controller to the user, so that the power switching units and the remote controller can be used universally.

Although the preferred embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope
15 and spirit of the invention as disclosed in the accompanying claims.

Claims

1. A wireless power switching system for supplying/interrupting power applied through an outlet to electric appliances, comprising:

one or more power switching units each comprised of:

5 an RF signal receiving unit for demodulating and decoding a received RF signal,

a power switch for supplying/interrupting power applied through an outlet to electric appliances, and

10 a first control unit for controlling the operation of the power switch in response to a signal demodulated and decoded by the RF signal receiving unit;

a wireless remote controller comprised of:

a memory for storing unique codes allocated to the power switching units and instruction codes required to control the power switching units,

15 a second control unit for accessing the memory in response to a user's instruction inputted through a keypad and generating a control signal for controlling a certain power switching unit, and

20 an RF signal transmitting unit for encoding and modulating a signal generated by the second control unit and wirelessly transmitting the encoded and modulated signal to the power switching unit.

2. The wireless power switching system according to claim 1, wherein the power switching units each further include:

25 an ON/OFF/AUTO switch for turning on/off the power switch in response to the operation of the user or setting an operation mode of the power switching unit to receive an output signal of the wireless remote controller;

a timer for counting a time; and

a time setting unit for storing prearranged time information inputted by the user to control the power switch,

wherein the first control unit sets the operation mode of the power switching unit

according to switching operation of the ON/OFF/AUTO switch and switches over the power switch if a time indicated by the timer reaches a prearranged time.

3. The wireless power switching system according to claim 1, wherein the wireless remote controller further includes:

5 a timer for setting a time;

a time setting unit for storing information of a power switching unit subject to control and prearranged time information, which are inputted by the user, so as to control the power switch; and

10 a card recognizing unit for recognizing a card storing identification information of an authorized user, information of a power switching unit subject to control and a control instruction of a corresponding power switching unit,

15 wherein the second control unit accesses the memory to generate a control signal for controlling a corresponding power switching unit if a time indicated by the timer reaches a prearranged time, and generates a control signal for controlling a specific power switching unit according to a recognized result by the card recognizing unit.

4. The wireless power switching system according to claim 1, wherein the second control unit divides the power switching units subject to control into a plurality groups to manage the divided power switching units using a directory form.

20 5. A method of controlling a wireless power switching system, the power switching system having a plurality of power switching units for controlling the supply of power to electric appliances and one or more remote controllers for wirelessly controlling operation of the power switching units, comprising the steps of:

switching each of the power switching units to a registration standby mode, by a control unit of each power switching unit, in response to switching of a reset key;

25 registering each power switching unit switched to the registration standby mode in a selected group and a position in the selected group, by a control unit of the remote controller, in response to key input by a user;

wirelessly transmitting corresponding registration information to each power switching unit switched to the registration standby mode by the control unit of the remote controller if each power switching unit is registered in the remote controller; and

storing the registration information extracted from the received signal in a memory
5 by the control unit of each power switching unit if a wirelessly transmitted registration information signal is received.

6. The method of controlling a wireless power switching system according to claim 5, wherein the registration information signal includes group information, in which each power switching unit switched to the registration standby mode will be registered, and
10 position information in the corresponding group.

7. The method of controlling a wireless power switching system according to claim 5, wherein if the reset key is switched, the control unit of each power switching unit clears all data stored in the memory.

8. A method of controlling a power switching unit in a wireless power switching
15 system for supplying/interrupting power applied through an outlet to electric appliances in response to a switching operation of a user or a transmission signal from a wireless remote controller, comprising the steps of:

performing a standby mode for receiving the transmission signal from the wireless remote controller through an RF signal receiving unit if an operation mode is set to an RF
20 signal reception mode;

determining whether a unique number included in a corresponding RF signal is identical with a unique number allocated to the power switching unit if an RF signal is received;

supplying or interrupting power to electric appliances by switching a power switch
25 in response to a control instruction included in the RF signal if the received unique number is identical with a unique number allocated to the power switching unit;

supplying power to electric appliances by switching the power switch if the operation mode is set to a power supplying mode; and

interrupting power supplied to the electric appliances by switching the power switch if the operation mode is set to a power interruption mode.

5 9. A method of controlling a wireless remote controller in a wireless power switching system for supplying/interrupting power applied through an outlet to electric appliances in response to a switching operation of a user or a transmission signal from a wireless remote controller, comprising the steps of:

10 accessing a memory to search for a unique code and a control instruction code of a corresponding power switching unit subject to control in response to a user control instruction inputted to control at least one power switching unit for supplying/interrupting power applied through an outlet to electric appliances;

generating a control signal for controlling a power switch of a corresponding power switching unit using a searched code; and

15 converting the generated control signal to an RF signal and wirelessly transmitting the RF signal to a corresponding power switching unit.

10. The method of controlling a wireless remote controller according to claim 9, further comprising the steps of:

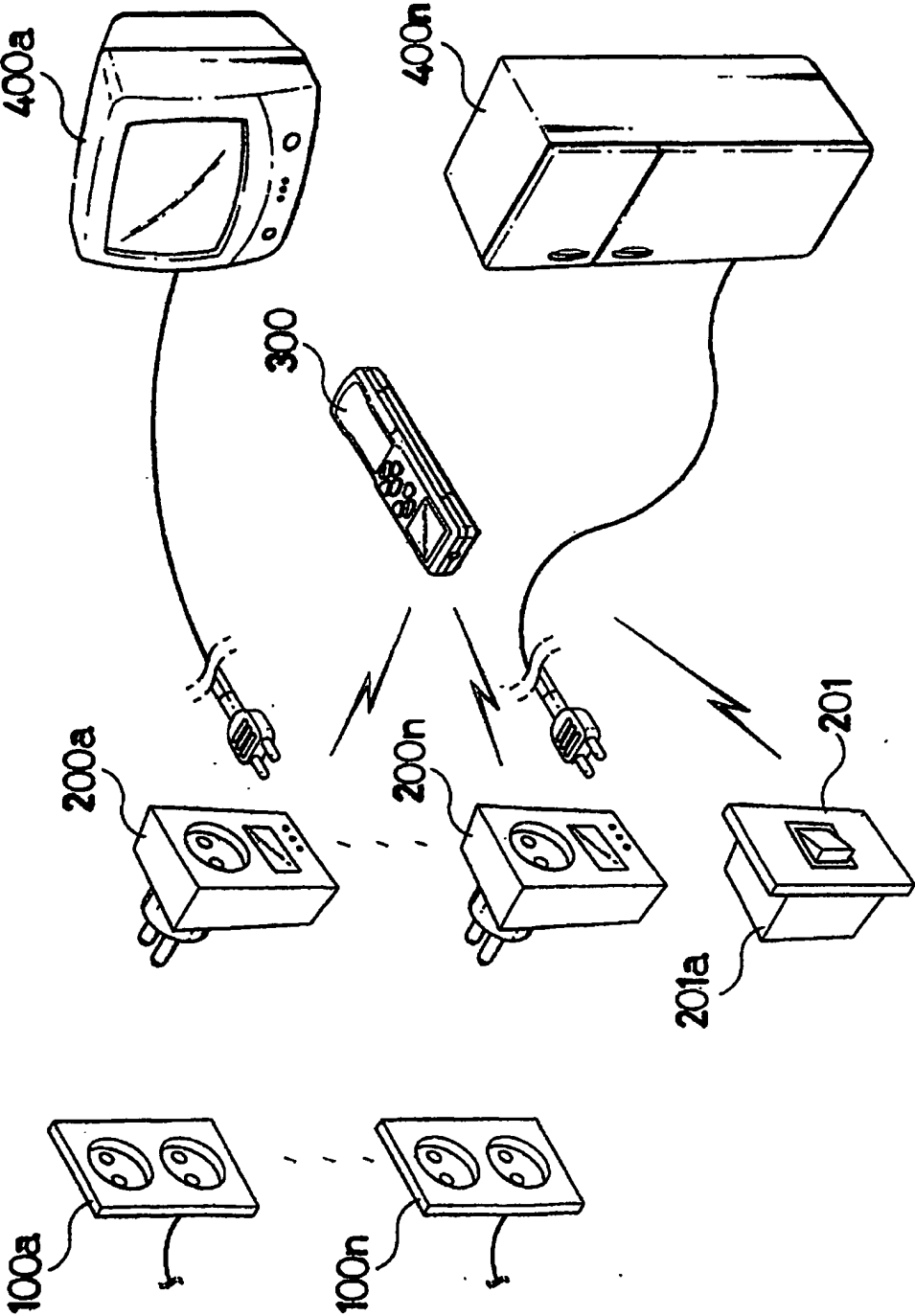
20 determining whether a prearranged time has arrived if prearrangement setting is performed in response to a user control instruction inputted to control at least one power switching unit for supplying/interrupting power applied through an outlet to electric appliances;

searching for a power switching unit subject to prearranged control if the prearranged time has arrived; and

25 generating a control signal for controlling a corresponding power switching unit and wirelessly transmitting the control signal if the power switching unit subject to prearranged control is searched for.

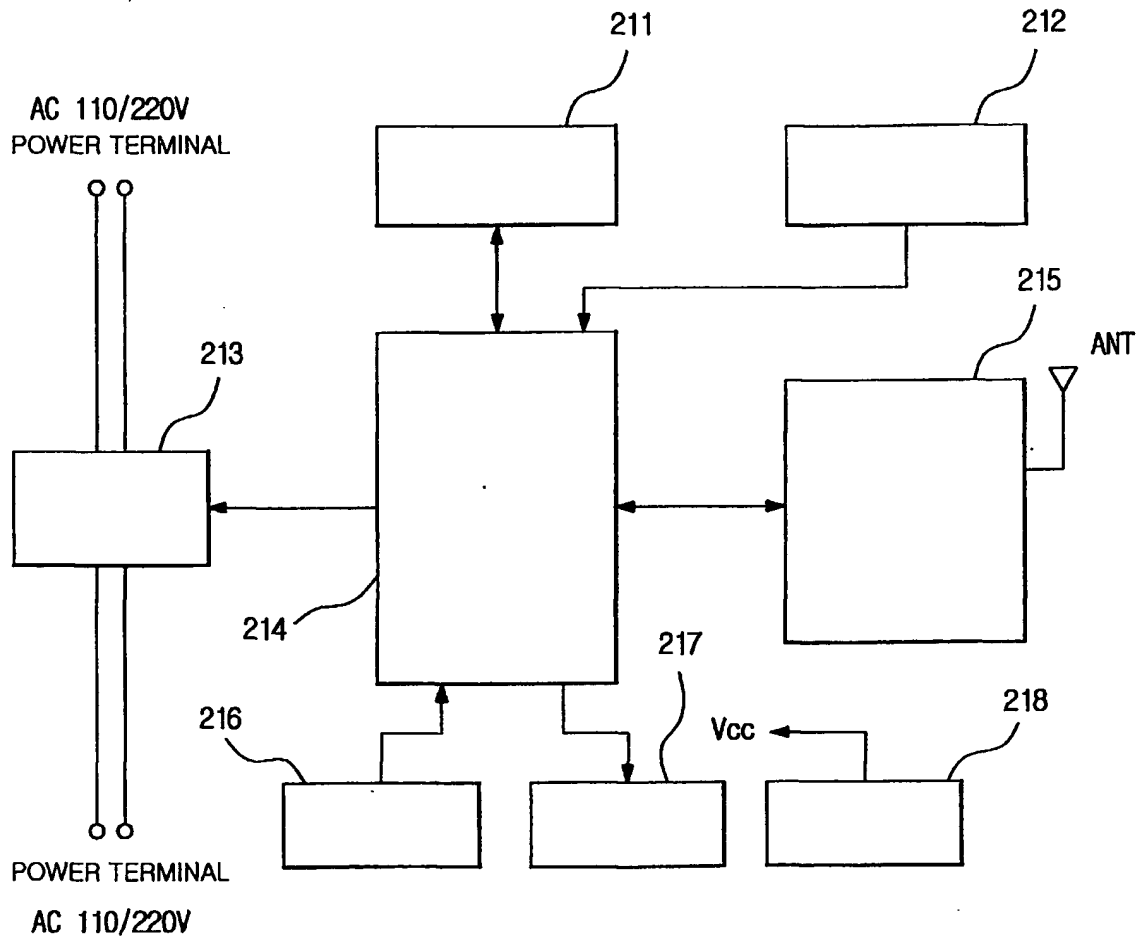
11. The method of controlling a wireless remote controller according to claim 9, further comprising the steps of generating a control signal for controlling a corresponding power switching unit and wirelessly transmitting the control signal if a card which stores identification information of an authorized user, information of a power switching unit
5 subject to control and a control instruction of a corresponding power switching unit, is recognized.

FIG. 1



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FIG. 2



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FIG. 3

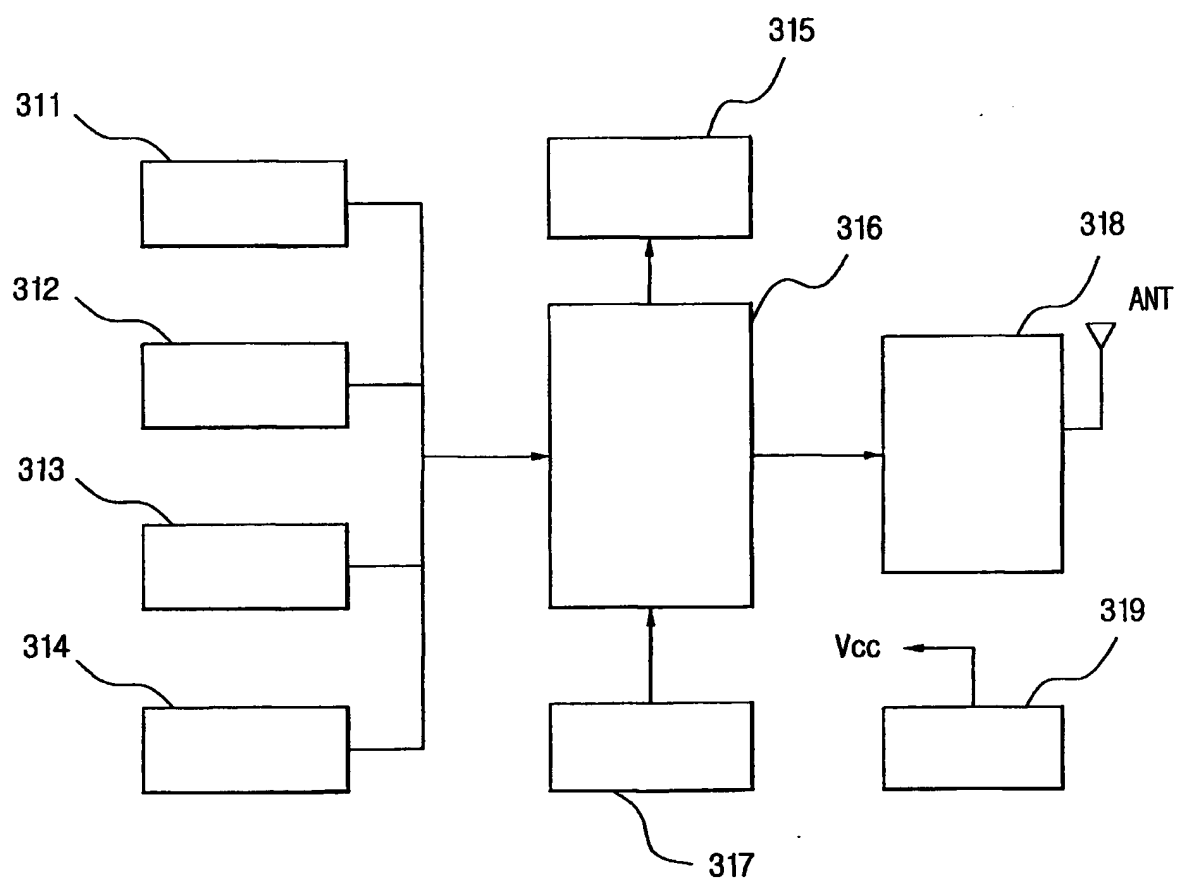


FIG. 4

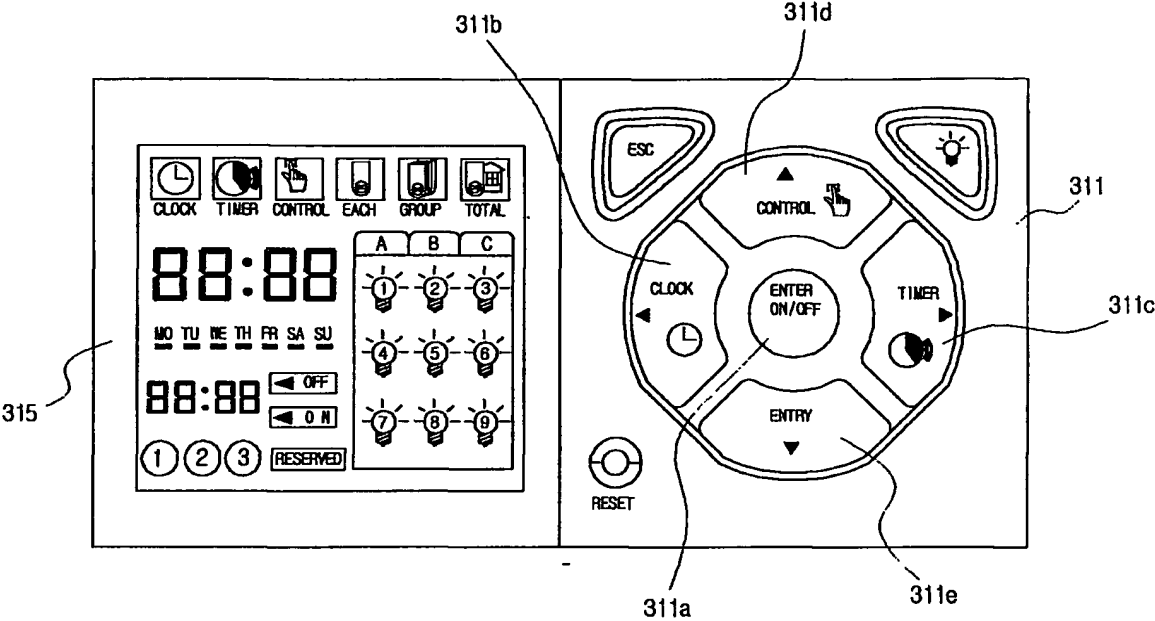


FIG. 5

START_BIT	IN-USE REMOTE CONTROLLER ID	T/C REGISTRA- TION ID	T/C REGISTRA- TION ID-1	GROUP(A,B,C)	T/C REGISTRA- TION FLAG	END_BIT	CRC
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FIG. 6

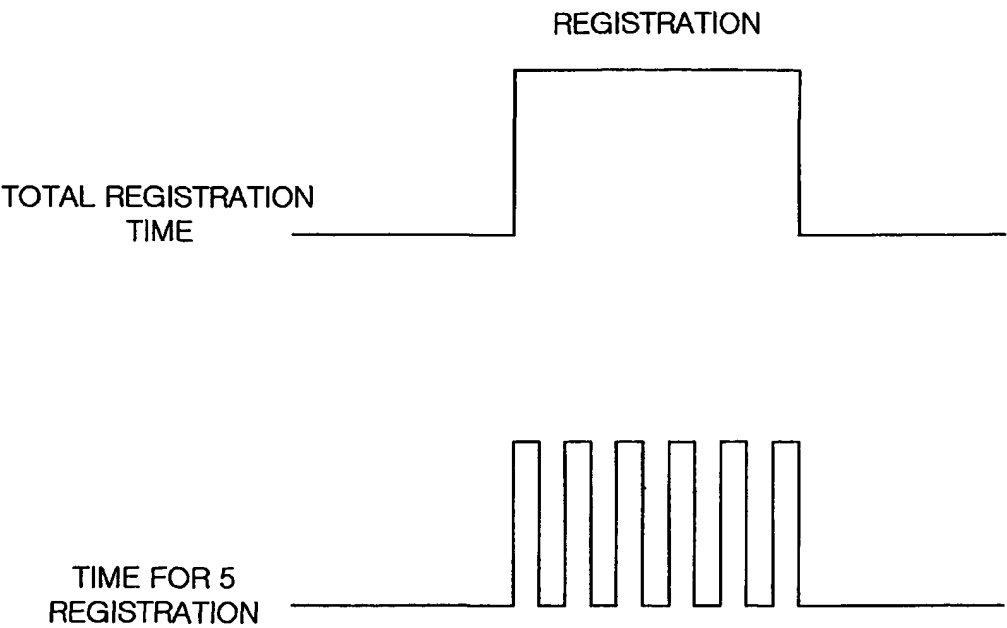
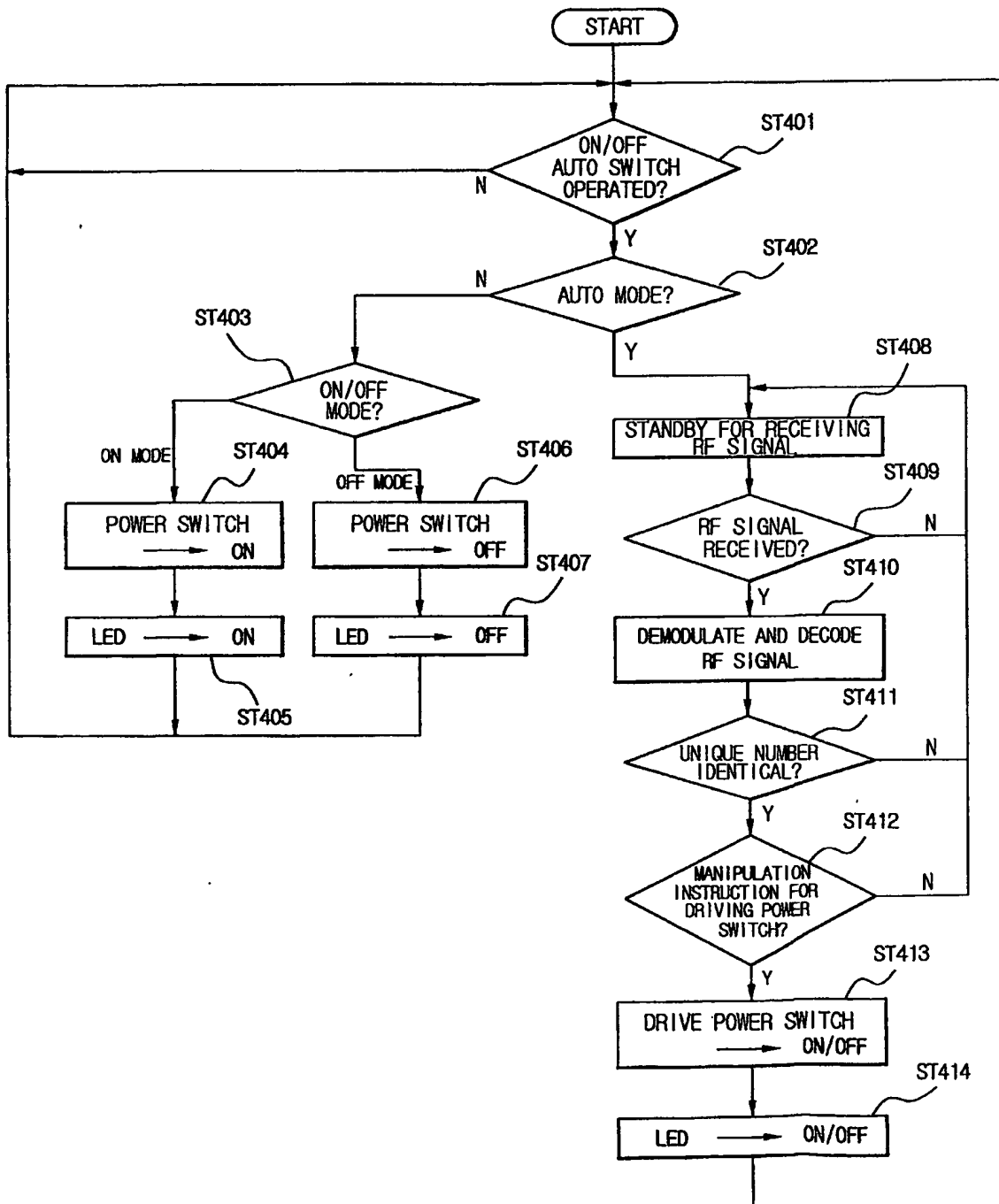


FIG. 7

START_BIT	IN-USE REMOTE CONTROLLER	T/C CONTROL ID	T/C CONTROL ID-I	ON/OFF CONTROL BIT	GROUP(A,B,C)	END_BIT	CRC
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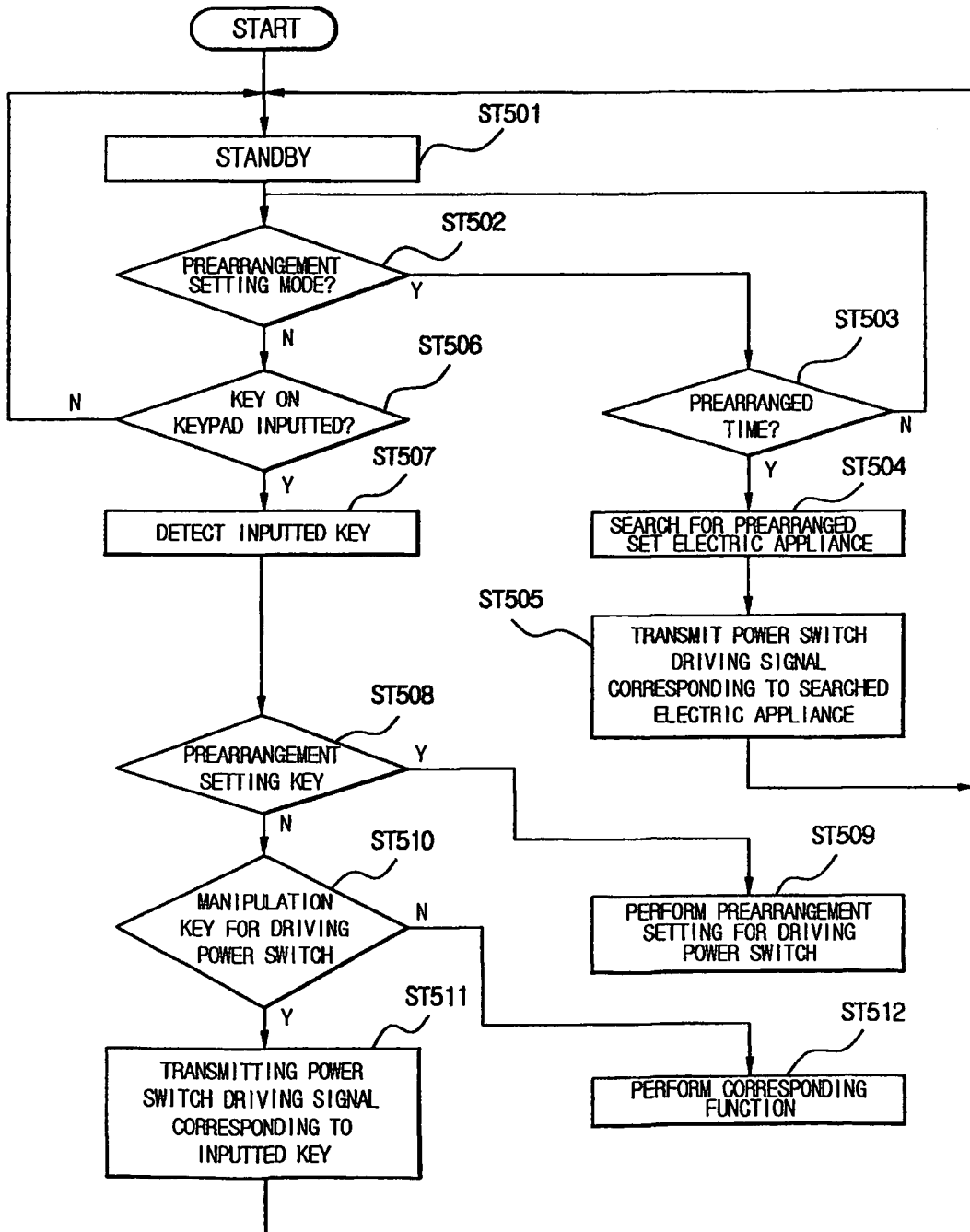
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FIG. 8



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FIG. 9



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR02/00157

A. CLASSIFICATION OF SUBJECT MATTER

IPC7 H04Q 9/00, H01R 13/70, H01R 31/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7 H04Q 9/00, H01R 13/70, H01R 31/06

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Patents and applications for inventions since 1975

Korean Utility models and applications for Utility models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

KIPASS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KR 2001-0069848 A (YEO) 25 JULY 2001	1 - 4, 8 - 11
Y		5 - 7
Y	JP 9-84147 A (SONY CO.) 28 MARCH 1997 paragraph 0014 - 0022, paragraph 0032 - 0034	5 - 7
X	JP 7-288883 A (TAKACHIHO TSUSHO KK) 31 OCTOBER 1995	1
X	KR 20 - 0227804 Y (KOREA ELECTRON) 06 APRIL 2001	1

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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"&" document member of the same patent family

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21 MAY 2002 (21.05.2002)

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Name and mailing address of the ISA/KR



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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/KR02/00157

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
KR 2001-0069848 A	25. 07. 2001.	NONE	
JP 9-84147 A	28. 03. 1997.	US 5898386 B CN 1150725 A	27. 04. 1999. 28. 05. 1997.
JP 7-288883 A	31. 10. 1995.	NONE	
KR 20 - 0227804 Y	06. 04. 2001.	NONE	